

WATER CORPORATION OF WESTERN AUSTRALIA

**GOLDFIELDS AND AGRICULTURAL WATER SUPPLY  
HISTORY PROJECT**

Transcript of interviews with

**KENNETH JOHN KELSALL**

Public Works Department and Metropolitan Water Authority engineer; educated at Aquinas College and the University of Western Australia [BSc(Eng)1942, BE 1947], PWD cadet engineer (1939), supervised for Allied Works Council construction of fuel oil tanks and gun emplacements at Fremantle, Albany and Onslow (1942-44), joined the PWD Hydraulic Engineer's Branch (1946), District Engineer at Katanning (1949) and Harvey (1951), Construction Engineer for Major Hydraulic Undertakings, Engineering Superintendent Ord Dam, Chief Engineer PWD (1972-80), Chief Engineer Metropolitan Water Board (1981) and of Metropolitan Water Authority (1982-85), Member of the Order of Australia (AM) 1986.

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Interviewer:	Richard G Hartley
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Transcriber:	Anne McBride
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## KENNETH JOHN KELSALL

### BIOGRAPHICAL NOTES

Kenneth Kelsall was born in Subiaco on 11 March 1921. His mother was a schoolteacher from Norwich, England, who had first met her future husband when he was in England with the AIF in 1917. Kelsall was educated at North Perth State School, St Brigid's Convent School and Christian Brothers' College, Perth (St. George's Terrace). His final year at school, 1938, was the first year of C.B.C, Perth, at its new Manning site and under its new name, Aquinas College. He was awarded a Government General Exhibition, and in 1939, he enrolled at the University of Western Australia to study engineering. On 28 March 1939, he joined the Public Works Department of Western Australia (PWD) as a cadet civil engineer. Kelsall was a talented performer in athletics, Australian Rules football and cricket. In 1939 he was State junior champion at 100 yards and long jump and was captain of the University's XVIII in 1941.

In the university short vacations Kelsall worked in the PWD drawing office and in the long summer vacations on Fremantle Harbour works (1939/40), on the construction of a 2,000 ton slipway at Fremantle (1940/41) and on the construction of Stirling Dam (1941/42). At the beginning of 1942 the Faculty of Engineering at UWA decided to replace, for the duration of the remainder of the war, the five year Bachelor of Engineering (BE) course with a three year general engineering course leading to a Bachelor of Science (Engineering) degree [BSc.(Eng)]. Kelsall was one of three students who were advised that they "had covered the work and attained the standard required" for the degree of BSc(Eng) and therefore need not return to the university. After two months at Stirling Dam, he did 10 weeks military training in the Royal Australian Engineers and Army Ordinance, and then returned to the PWD where he found that he had been placed in a reserved occupation category and was assigned to work on a programme of defence works. These were being carried out by the PWD on behalf of the Allied Works Council, and mainly consisted of seaboard storage tanks for petroleum products and coastal defence gun emplacements. Kelsall worked on the construction of reinforced concrete oil storage tanks at South Fremantle, and fuel oil, diesel and petroleum storage tanks of composite steel and concrete construction at Albany. Kelsall then worked on the planning and construction of artillery emplacements on Garden Island before being transferred to the North West Branch of the PWD to construct a sea board storage installation for fuel oil, diesel and aviation spirit at Onslow. He was in Onslow from August 1943 to December 1944 and completed the strategically important installation to schedule despite a Japanese air raid and the many difficulties associated with remote area construction during wartime.

After a period at Perth Head Office working for the North West Branch, Kelsall was attached to the Metropolitan Water Supply, Sewerage and Drainage Dept for four months supervising extensions to sewerage reticulation and sewage treatment plants. He then spent three months from September 1945 in the East Kimberley supervising test drilling for the Ord River dam and the relocation of buildings for the Kimberley [Agricultural] Research Station. He returned to UWA for the 1946 academic year to successfully upgrade his BSc(Eng) degree to a BE Hons. His thesis was entitled 'Wartime storage of petroleum products'. He later won the IEAust (WA) Juniors and Students Prize for a paper on the same subject.

He rejoined the Hydraulic Engineer's Branch of the PWD, at the end of 1946, to work on earth and rock placement at the Stirling Dam, where work had restarted after a wartime break. He returned to the East Kimberley in May 1947 to extend the Kimberley Research Station irrigation area. In



October 1947 he moved to Katanning where he supervised the enlargement of the existing Pinwerning Dam for the Katanning water supply, and the building of reservoirs at Ongerup, Gnowangerup and Mt Clarence (Albany). On 20 November 1948 Kelsall married Anne McGrath and the couple's first home was a demountable house, 20 ft x 20 ft, provided by the department at Lake Grace where Kelsall was supervising the construction of five key dams from which farmers could cart water in dry years. The Kelsalls move to Katanning in February 1949 (with the house) where he became the Branch's first District Engineer. The 1949 winter rains were below normal in the Great Southern and Kelsall worked on water supply problems for Narrogin, Katanning, Pingelly, Bridgetown and Albany before being transferred, in 1950, to the latter stages of the raising of Mundaring Weir where he replaced Bob Hillman as concrete engineer under Resident Engineer, Harold Hunt.

In 1951, Kelsall moved to Harvey where he spent over three years as resident engineer in charge of the extension of Harvey Irrigation Area and of the construction of other hydraulic works in the district. While in Harvey, Kelsall, in a voluntary capacity, started to apply engineering principles to the design, construction and maintenance of trotting tracks, and applied soil blending and compaction to the Harvey track. He subsequently acted as honorary consultant for the upgrading of many of the country trotting tracks in Western Australia, and also for the reconstruction of the metropolitan tracks. In 1980 he prepared a report on the standardisation of trotting tracks which was endorsed by the Australian Trotting Council for national use. In 1995, the Western Australian Trotting Association awarded Kelsall the James Brennan Award, the Association's highest award.

In November 1954 Kelsall moved to the Construction Section of the Hydraulic Engineer's Branch (HEB) in Perth Head Office, under Harold Hunt. The period from 1954 to 1962 was a very busy time in water supply engineering and Kelsall was involved in the planning and construction supervision of many, and varied, country town water supply schemes. The majority were built by departmental day labour but two dams, the Tanjannerup Creek Dam (for Nannup water supply) and the Logue Brook irrigation dam were the first major dams to be built by contract for over 50 years. They were built under new conditions of contract more suited to larger scale works. The raising of Wellington Dam by 50 ft to supply Great Southern towns as the first stage of the Comprehensive Water Supply scheme made good use of the experience gained at Mundaring. Progress on the associated pipeline to Narrogin, which was being built by the GWS Branch using the techniques developed before the war, was slowed by the shortage of steel pipes. Camballin barrage on the Fitzroy River was the first major hydraulic work in the north, followed by the first stage of the Ord River Scheme, the diversion dam and the first irrigated areas.

In a major reorganisation of the PWD, in 1962, both the GWSB and the HEB were abolished. The new Country Water Supply Branch (CWSB) took over the GWSB and the HEB's work on country town water supplies except for the building of major dams for town supplies. A new branch, the Construction Major Hydraulic Undertakings Branch (CMHUB), became responsible for the construction of major works which included most of the second stage of the Comprehensive Scheme, except for the upgrading of the main conduit to Kalgoorlie. Kelsall became Engineer Construction MHUB under Hunt who was Executive Engineer. The next ten years (1962-72) was one of major water supply expansion to service new mining projects in the Pilbara and Goldfields. Kelsall became increasingly involved in the planning of main Ord Dam. The dam site was determined and a rockfill dam was found to be preferable to the mass concrete construction originally proposed. Kelsall inspected dams of similar construction on the Snowy Mountain Scheme, and as engineering superintendent for the construction contract, escorted the selected



tenderers on detailed site inspections. In November 1968, the contract was awarded to Dravo Pty Ltd the Australian subsidiary of an American company. The dam was built over three years (1969-71) and was opened in June 1972. The construction went largely as planned and the dam became a landmark in Australian dam construction. However, Dravo had underestimated the costs of working in the Kimberley and also the hardness and abrasiveness of the rock used. The company put in a claim for unforeseen costs which in January 1975 went to Arbitration in which Kelsall was the main government witness. Dravo could not substantiate their claim and lost.

In 1970, Parker, the Director of Engineering, retired and was succeeded by Don Munro. Hunt became Chief Engineer, and Kelsall, Executive Engineer Construction. In December 1971, Munro was appointed Coordinator of Development. Hillman moved from the Metropolitan Water Board to become Director of Engineering. Harold Hunt took his place as the Water Board Chief Engineer and Kelsall became Chief Engineer of the PWD, a position which was retitled Deputy Director of Engineering in January 1975. The numbers of major works required began to diminish after 1972 and operational requirements began to assume greater importance in the department's responsibilities. Consequently, a major reorganisation of the department was undertaken in 1975 in the form of regionalisation. The six functional branches in the department, including the CMHUB and the CWSB, were replaced by two major operational branches, Operations South (OS) and Operations North (ON). With changing political priorities, greater emphasis was also placed on more detailed planning and on public accountability. Major works included water supply provision for an expanding Mandurah and the De Grey Scheme in the north-west.

In October 1980, Hunt retired and Kelsall was appointed Chief Engineer of the Metropolitan Water Supply, Sewerage and Drainage (MWSS&D) Board. This position was retitled Director of Engineering in May 1981. When he left the PWD, Kelsall was the longest serving engineer on the department's staff. In 1980, the MWSS&D Board was introducing major changes. After severe water restrictions in 1978, the use of ground water from shallow unconfined aquifers at Gngangara and Jandakot was being extended. Following the Binnie Financial Report (1979), the Board had introduced "pay for use" water charging in place of the old method of payment based on property rateable values, and developers were required to pay for reticulation extensions. One of Kelsall's first tasks was to reach an agreement with developers on a system of contributions towards the building of headworks. The major works constructed in the period 1980-85 were the sewage treatment works at Woodman Point and an effluent disposal scheme by ocean outfall at Point Peron, plus Buckland Hill reservoir. The outfall project received the 1984 Engineering Excellence Award presented by the Institution of Engineers, Australia (WA). Also a paper written jointly by Kelsall and B. Cox (of consultants Binnie and Partners) received the 1987 Overseas Award presented by The Institution of Civil Engineers (UK).

In June 1982, the MWSS&D Board was reorganised and renamed the Metropolitan Water Authority. Kelsall, as Director of Engineering became an ex officio member of the Authority's Board. Following the 1983 state election, there was a change of government. One of the first actions of the Burke Labor Government was to announce a proposed merger of the Country Water Supply section of the PWD and the Metropolitan Water Authority to form a single state-wide organisation which was to take effect from 1 July 1985. As Kelsall was due for retirement at age 65 in March 1986, he did not seek a position in the new body, called the Water Authority of Western Australia, and retired on 14 June 1985.

Kelsall served as Chairman of the Water Resources Council from June 1984 to December 1987 and on the Board of the Metropolitan Water Authority (1982-1985) and of the Water Authority of



Western Australia from 1985 to the end of 1990. In June 1986 Kelsall was appointed a Member of the Order of Australia (AM) 'for services to the engineering profession – particularly in the development of Western Australia's water resources'. He was Chairman of the Great Southern Regional Development Committee (1972-1977) and also of the South-West Regional Development Committee (1972-75). From 1973 to 1985, he was chairman of the steering committee which coordinated research into the effects of the wood-chip industry on water resources.

Kelsall has taken an active interest in the Institution of Engineers, Australia and was a National Vice President in 1975 and 1976. He was Chairman of the Western Australia Division in 1976. His Retiring Chairman's Address was entitled 'A History of the Institution in Western Australia'. In November 1987, he was elected an Honorary Fellow of the Institution of Engineers, Australia, only the fifth Western Australian engineer to be granted this honour. From 1964 to 1970 he was visiting lecturer in engineering construction at the University of Western Australia.

Ken and Anne Kelsall had four children, a girl and three boys, the youngest of whom is a professional engineer. Anne died in 2007.

*Publications and library lodgements:*

- 'A History of the Institution in Western Australia', Retiring Chairman's Address presented at the Annual General Meeting of the Western Australia Division of the IEAust on 31 March 1977, 6 pp. [Battye Library of West Australian History: Private Archives, IEAust (WA) archive].
- 'Documents relating to the history of professional engineering institutions in Western Australia', compilation of document copies, with index. [Battye Library, also IEAust (WA) library]
- 'The initial phase of an engineering career 1939–1945', December 2003, 53 pp. [Battye Library, also IEAust (WA) library]
- With B.G. Cox, 'Construction of Cape Peron ocean outlet: Perth, Western Australia', *Proc ICE*, Part 1, 1986, 80, April, Water Engineering Group, pp. 465–91
- 'The Comprehensive Water Supply Scheme', *Journal of Agriculture, Western Australia*, vol. 18, no. 3 (series 4), 1977, pp. 68-72.
- 'An ecological problem at the Ord River Dam', *ANCOLD Bulletin*, Issue 37, February 1973, Australian National Committee on Large Dams, pp. 15-17.
- 'Notes on bulk fuel installation, Onslow', June 1995, 27 pp. Copy of ms. [Battye Library Q 665.544 KEL]
- 'Fuel oil storage tanks: South Fremantle', October 1996, 9 pp. Copy of ms. [City of Fremantle Library, Local History Section]
- 'Key dams in cereal/sheep areas in Western Australia', Notes for Hon. Minister [for Works], 22 November 1973, 6 pp. Copy of typescript. [Battye Library]

26 April & 6 May 2004



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## TRANSCRIPT CONTENTS

### SESSION ONE

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- 1 How PWD Construction Branch became involved in Comprehensive Water Supply Scheme (CWSS). Stage 1 of Modified CWSS was to increase capacity of GWSS for agricultural use and supply Great Southern towns from Wellington Dam. GS towns had local, unreliable schemes: Brookton, Pingelly, Wagin, Narrogin, Katanning.
- 2 Raising Mundaring Weir 32 ft and Wellington Dam 50ft under CWSS. Goldfields Water Supply Branch operated main conduit to Kalgoorlie and reticulation plus local schemes in EG. Hydraulic Engineer's Branch operated all other country town supplies except NW, also responsible for irrigation and drainage schemes and for building main dams. Irrigation areas. HEB responsible for raising dams. GWSB to do rest of stage 1 including pipeline to Katanning and Brookton. Stage 2 of CWSS after 1962 reorganisation of PWD into 5 branches: CWSB, I&DB, PD&IB and CMHUB.
- 3 Also Country Town Sewerage Branch. In Stage 2 of CWSS Construction Branch to do all Southern Section, plus area north of Northam and some in central part (Cunderdin-Quairading). Large pipework to GWS techniques. Variations in smaller pipes. Large pipes factory cement lined.
- 4 Cement lining done manually in 1930s. Mathers (Kellerberrin) welded two half segments together. Stage 2 financed by repayable loan funds. Labour shortage after war. KK returned to UWA in 1946 to complete BE. Unsettled.
- 5 Father (badly injured in WW1) died December 1946. KK obtained BE Hons (third class). Thesis was 'Wartime storage of petroleum products'. Also won IEAust (WA) 1949 J&S prize. Returned to PWD in Nov. 1946 at Stirling dam on earth and rock placement. Steam navies, trucks, bulldozers and sheeps-foot rollers. Also Byass, Park, Poole, Bryden, Hillman. Then to Wyndham (May 1947) to extend Kimberley RS. 114 HP diesel from Mundaring PS1 (for PS wartime emergency use).
- 6 October 1947 to Katanning (Pinwerning Dam, reservoirs at Ongerup, Gnowangerup and Mt Clarence). October 1948 to Lake Grace for key dams at 5 locations (used for carting supplies). Back to Katanning (Feb 1949) to establish district office (first by HEB).
- 7 1949 winter rainfall below average in Great Southern. Problems at Narrogin (Bottle Creek Dam), Albany main from Two People Bay, Katanning supply 2 days per week, Pingelly too salty, Bridgetown Fibrolite pipe bursts. Made by Sutton process – AC wrapped spirally.
- 8 AC pipes next by Mangiani process (a good light pipe). Then by Mazza process (better). Alternative RC cast pipe was heavy and chipped at joint. Cast iron, good but heavy and expensive. Vertically cast pipe replaced by spun CI pipe. RC pipe difficult to make connections. August 1950 to Mundaring Weir which was coming out of difficult early period. On mixing and placing concrete.
- 9 Pumping concrete. Blockages and power cuts caused problems. September 1951 to Harvey for new irrigation and drainage area (Harvey/Benger) also did other work in district (Capel River drainage). To PWD HO At Barracks in Nov. 1954 to Construction Branch of HEB. Munt died, Munro became HE. Raising Wellington Dam, Logue Brook Dam, Tanjannerup Dam (Nannup). First dam by contract.
- 10 Difficulties and advantages of contracting. Continuity difficult with day labour. For maintenance and operations day labour better. Fitzroy River barrage, construction of Kununurra, Ord River diversion dam. 1954-62 day labour jobs in south (Mt Barker, Bolganup Dam (Porongurups), Cranbrook, Tambellup, Millstream (Bridgetown), Albany (Little Grove bores and softening plant), Phillips Creek Dam (Manjimup) plus several others and 3 swimming pools (Notham, Goomalling, Quairading)
- 11 1962. Jim Young retired as D of W, replaced by John Parker. PWD reorganisation into 4 branches plus one.



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## TRANSCRIPT CONTENTS

### SESSION TWO

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- 1 KK married Anne McGrath on 20 November 1948. Because of the housing shortage, the PWD provided a demountable house at Lake Grace in 1948. Only 20 ft x 20 ft. Panels bolted to floor plus trussed roof. Moved with it to Katanning where it was put on block next to Road Board Chairman's house.
- 2 To raising of Mundaring Weir, in 1950, to replace Bob Hillman. Earlier shortage of cement and power. Unstable workforce. Harold Hunt (HEH) was Resident Engineer. Both played cricket for local teams. Displaced persons large proportion of workforce, particularly Poles.
- 3 To Harvey in 1951. Expansion of irrigation reticulation to use Stirling dam water. Liked Harvey but house very small (from internment camp). Job held up as most state loan funds went to Kwinana infrastructure. Supply and subsidiary channels, occupation crossings, floodgates at Capel and big drops at Dardanup. Moved to Head Office Nov. 1954.
- 4 Construction Section of Hydraulic Engineer's Branch (HEB). HEH, Officer-in-charge; Don Munro, Hydraulic Engineer; Stan Byass, Principal Assistant to Munro. 1954-62 very busy time in water supply construction. Raising Wellington Dam for supply to Great Southern towns. GWS constructed pipeline. Construction of Logue Brook Dam by contract to augment Harvey Irrigation, just opposite Cookernup.
- 5 New General Conditions written by HEH and Leo Regan (Crown Law). PWD already had a form of General Conditions but no good for large projects. Upgrading Wicherina to Geraldton pipeline, Phillips Creek Dam for Manjimup. Other WS schemes: Bolganup Dam for Mt Barker. Cranbrook, Tanjannerup Creek Dam (Nannup) built by contract. Eight other town schemes noted plus three swimming pools.
- 6 Stage 1 of CWSS. Shortage of pipes. First pipes on southern section "laid" in 1948 but were unconnected. Camballin scheme on Fitzroy, barrage by government for private irrigation scheme. Kim Durack's connection. Barrage with collapsible shutters. Company got into financial difficulties. Scheme all on flood plain and had largest ever flood.
- 7 Ord Scheme Stage 1. HEH responsible for all Stage 1 contracts. Christiani & Neilson & Clough did diversion dam. In irrigation area Keith Earthmoving got into trouble, underestimated the NW. 1962 reorganisation of PWD Engineering Division. John Parker's title changed from Director of Works to Chief Engineer.
- 8 Dumas as Director of Works had controlled both engineering and architectural divisions of PWD but latter became more independent. GWSB and HEB abolished. New branches Country Water Supply Branch (Keating), Irrigation and Drainage Branch (Bryden), Planning, Design and Investigation (PD&I, John Lewis), Construction Major Hydraulic Undertakings Branch (Construction MHU Branch, Hunt). Irrigation design had been done by Reg Edwards, I&D engineer in HEB. After Munt became HE, he set up his own design group which became the PD&I Branch.
- 9 Make up of the new Branches. Construction Branch given responsibility for Stage 2 of the CWASS and new CWSB given management over all country supplies. Millstream Dam to supply Bridgetown. Pipeline built by John Abbot to a pipehead dam. Millstream Dam built by Thiess.



- 10 Menzies opened Ord River Diversion Dam on 20 July 1963 and Logue Brook Dam opened on 4 October. Carnarvon pipeline in Gascoyne River. Waroona Dam on Drakes Brook. Another dam at Manjimup. Glen Mervyn Dam on Preston River. New spillway on Harvey Dam. Extensive pipelines on Southern Comprehensive Scheme and to north of Northam, also main from No. 6 PS to Koolyanobbing. Albany bore field and water softening plant. Groundwater source for Geraldton at Allanooka (Dongara also).
- 11 Wicherina supply switched to Mullewa. Seven country town supplies. In the North-west supply for Exmouth. US Navy put in own supply which failed. Port Hedland supplies from the Turner River and Yule River aquifers. HH became Executive Engineer Construction and KK became Engineer Construction Major Hydraulic Undertakings Branch.
- 12 Ord River Stage 2. Commonwealth reluctant. PD&I Branch (Webster, Wilkin and Wark) finalised design with SMA. Dumas' seven sites. Dumas wanted concrete dam as weir. Change to rockfill. KK to Snowy dams (Blowering and Talbingo).
- 13 Location at No. 2 site with spillway five miles away. Village for contractors started. Pre-selection of tenderers. Detailed site inspection. Eight selected tenderers. Dravo new to Australia came in when two others withdrew. Awarded to Dravo on 19 November 1968.
- 14 Built over 3 years (1969-71). Opened by Prime Minister McMahon on 30 June 1972. KK Engineer for contract. At same time new airport for Kununurra built. Commonwealth engaged PWD to supervise work. 1971, rock-fill dam on Mooloolah Creek to supply Wyndham. Rockfill but allowed to be overtopped.
- 15 Large works in Pilbara for Dampier-Karratha. Headworks were bores in Fortescue at Millstream with 84 miles of steel pipeline above ground. No formal specification existed for GWS pipe laying so one had to be written. (Colin Temby RE)
- 16 Pipeline Morawa to Pernjori. Large storage at Mount Roe. Parker retired in 1970. Munro became Director of Engineering. HEH to Chief Engineer. KK to Executive Engineer Construction. Next period 1970-86. Pipehead dam on Helna and pump-back to Mundaring. In Pilbara Millstream extended to serve Cape Lambert and Wickham. Concern at over-pumping of Millstream led to building of Harding Dam.
- 17 Millstream water hot when gets to Karratha. December 1971, Munro Coordinator of Development, Hilman to Director of Engineering, HEH Chief Engineer of MWB and KK Chief Engineer of PWD. KK had to do a lot of administration, also dealt with a number of harbourworks. Land clearing controls the most difficult issue.
- 18 As PWD responsible for water resources clearing control was its responsibility. Minister for Water Resources and field engineers copped the flack. Farmers Union very vocal. Realisation of need for controls came late but was essential. In Jan 1975 KK involved in arbitration with Dravo.
- 19 Magnificent dam but Dravo had underestimated Kimberley costs. Contractor claimed extra for rock which was hard & abrasive but lost.
- 20 There was talk of an *ex gratia* settlement but it was vetoed by Commonwealth. In 1978, KK asked by MWB to visit with Bob Fimmel (MWB), USA, UK and Sweden to inspect alternative waste water management systems. UK systems similar. Learnt most at US plants many of which were not working.
- 21 Use in Sweden of composting toilets but had to be monitored. Took over from HEH as Chairman of South-west and Albany Regional Development Committees. In January 1976 KK's position was re-titled Deputy Director of Engineering. October 1980 Hunt retired and on 22 October 1980 KK succeeded him at Chief Engineer of the MWB. On 1 May 1981 his



position was retitled Director of Engineering. KK surprised at level of stress being experienced by officers of the MWB.

- 22 MWB recovering from major drought and water restrictions. One of first jobs was to agree with developers on head works contributions. PWD regionalisation in 1975 (Operations North and Operations South) precipitated by tailing off of major works. Main change was abolition of functional branches and the setting up of 2 major operational branches that did everything. De Grey Scheme in Pilbara (ON) and Mandurah works (OS).
- 23 End of tape

RGH 25 February 2004.



**GOLDFIELDS WATER SUPPLY HISTORY**  
**Interview with Ken Kelsall**  
**on 17 May 2002 at Como, Western Australia**  
**Interviewer: Richard Hartley**

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RH This is Richard Hartley on 17 May 2002. I am talking this afternoon to Mr. Ken Kelsall at his home in Como, about his career and life in engineering and, in particular, his connections with the Goldfields Water Supply.

Good afternoon Ken. We are going to talk about how the two sections of the Public Works Department dealing with water supply eventually came together and how the northern part of the Comprehensive Water Supply Scheme was developed from the Kalgoorlie pipeline.

KK Well, what I thought we might do is analyse how the construction branch of the Public Works Department came to become interested in the Comprehensive Water Supply Scheme.

RH Yes.

KK Now, stage one of the Comprehensive Water Supply Scheme, which commenced in 1949, consisted of, firstly, increasing by stages the capacity of the pumping stations, service reservoirs and mains of the Goldfields Water Supply Scheme and reticulating water through about 1.6 million hectares of farmland and towns within the northeast sector of the wheat-belt. Secondly, constructing a steel main with pumping stations and service reservoirs from Wellington Dam to Narrogin and extending to supply the Great Southern towns from Brookton to Katanning. This particular project was known as the Modified Comprehensive Scheme and the State Government was assisted financially by the Commonwealth Government on a dollar for dollar basis.

RH How were the Great Southern towns supplied before then?

KK The Great Southern towns, before then, all had local schemes which were generally unreliable. They were based on local sources, either earth catchments, rock catchments or, in some cases, assisted by bitumen catchments. But in every case they were quite inadequate. Brookton had a dam. Pingelly was supplied from the Hotham River. It was always saline; it was never fit for drinking. Wagin had a local scheme which used the catchment of the Puntapin Rock. Narrogin had a dam at Bottle Creek which was served by an earth catchment plus [an area of bitumen]. Narrogin was the first town dam [in Western Australia] to have a bitumen catchment installed. It was constructed by the Main Roads Department during or round about wartime. Katanning also had a local scheme, much the same as Narrogin's, part served by a bitumen catchment and it was [far too] inadequate [to supply] the town. It was supplemented by some saline bores. At the time I knew it, Katanning had two days [per week] with fresh water turned [on] and the rest of the time it had saline water in the mains to keep the septic tanks and other things going in the town.

*Note: The transcript is verbatim except for minor editing by Mr Kelsall which is indicated by squared brackets thus [ ]*



- RH So those Great Southern towns had some [very poor] supplies.
- KK Yes, that would be so. As a matter of fact, country towns had [either no supplies at all or] pretty poor supplies, except the ones that were connected to the Goldfields Water Supply Scheme. I think that sums it up the best of all. Also included in the Comprehensive proposal was the raising of the storage dams at Mundaring Weir by 32 feet and Wellington Dam by 50 feet. These two projects were fully financed by state funds – no federal government assistance.
- RH You said there were two sections of the Public Works Department dealing with water.
- KK Yes, at that time, there were two branches: the Goldfields Water Supply Branch and the Hydraulic Engineer's Branch. The Goldfields Water Supply Branch was responsible for the operation of the main conduit from Mundaring Weir to Kalgoorlie, plus all towns and farmland areas supplied from that scheme. In addition, the Goldfields Water Supply Branch operated several local schemes throughout the Eastern Goldfields area. The Hydraulic Engineer's Branch was responsible for the operation of [all other country town] water supplies, excluding [those in] the north-west. These were few in number and they were served by generally unreliable schemes. The Hydraulic Engineer's Branch was also responsible for irrigation and drainage schemes and for the construction of all major dams [outside the Metropolitan Area].
- RH At that stage, the irrigation was mainly in the Harvey area, wasn't it?
- KK [Well, Harvey was the principal centre. However, there were two other districts, namely, Waroona and Collie. The Collie District (which included Brunswick and Dardanup) was supplied from Wellington Dam which is on the Collie River.]
- You will see that the Southern Comprehensive was outside the area normally covered by the Goldfields Water Supply Branch. However, because of its long experience with major pipelines, [the latter] was given the responsibility for the whole of stage one of the Modified Scheme, except for the raising of the two dams, which was carried out by the Hydraulic Engineer's branch.
- RH So the southern pipeline was done by the Goldfields Water Supply.
- KK That was done by the Goldfields Water Supply. The pipeline from Wellington Dam to Narrogin, up to Brookton and then down to Katanning – that was all done by the Goldfields Water Supply Branch.
- Now, by the time that the second stage of the Comprehensive Scheme was approved for construction to commence, there had been a major reorganisation of the Engineering Division of the Public Works Department.
- In 1962, the traditional water supply branches of the Public Works Department were abolished and replaced by four branches. They were the Country Water Supply Branch, which was headed by Reg Keating; The Irrigation and Drainage Branch, headed by Dave Bryden; The Planning, Design and Investigation Branch, headed by John Lewis; and the Construction, Major Hydraulic Undertakings Branch, which was headed by Harold Hunt.



[There was another specialist branch known as the Copuntry Town Sewerage Branch, headed by Tom Allison.]

In 1965, stage two of the Comprehensive Water Supply Scheme was approved and the Construction Branch was allocated the responsibility for all [construction] work in the southern section of the scheme. This included the mains from Katanning to Kojonup; from Katanning to Broomehill and Gnowangerup; as well as from Narrogin to Wickpin and Yealering, plus segments of the northern section of the scheme covering the towns such as Wongan Hills; Ballidu, Dalwallinu, Pithara and the farmlands at Kalannie and Koorda.

RH So was that the north-western section of the Comprehensive Scheme?

KK Yes, that's right. Anywhere due north of Northam, I suppose, is about the area.

It also undertook some work in the more central part of the scheme; for example, the Cunderdin to Quairading main and also some of the farmlands in this area.

So that just explains the work on the Comprehensive that was done by the two branches and, after the 1962 reorganisation, the Construction Branch was starting to assume some importance.

RH Was there any difference in the construction techniques in the pipeline building between the two sections?

KK The Goldfields Water Supply people, as a result of the work by Keating and Fernie in the 1930s, had developed a pipe laying technique for above-ground steel pipes. The underground steel pipes, because of the ineffective coatings and the rather hostile soil environment, had been rusted rather badly – or very badly. This system that they developed for the above-ground pipelines was followed in all the work done on Stage One of the Scheme. [This included] the enlarged pipeline from Mundaring eastwards and from Wellington Dam through to Brookton and Katanning.

The Construction Branch, when it took over, adhered mainly to the same procedures, although the Construction Branch had been experimenting with some variations of the Fernie-Keating system, I think the variations were mainly kept onto the smaller schemes like Albany and Bridgetown, and mostly, the work on the [larger] steel pipes was done to the Goldfields systems. Of course, as the schemes moved out into more remote areas, the pipes got smaller and then there was quite a lot of use made of reinforced concrete, spun cast iron and Fibrolite pipes – which were laid underground and had rubber ring joints.

RH And the larger pipes – the steel ones – they still had the cement mortar lining.

KK Oh yes, the above-ground steel pipes were all cement lined. [Where practical] the joints at the ends of each pipe the lining were repaired [in the field] where the welds took place, so that the pipes had a continuous lining of cement. [Otherwise] the cement linings, of course, had been applied in the factory by the spinning process.

RH So it wasn't like in the 1930s when they actually did cement lining in the field?



KK No. Well when they were lifting the pipes and cement lining them in the thirties, they [were dealing with] locking bar pipes and the locking bar pipes were virtually impossible to spin and to get a uniform coating on the inside. After they were lifted, they were cleaned then moved to where they were to be relaid. They were then cement-lined manually and then relaid above ground.

When some of the pipes were lifted in the thirties, they found that the bottom half of the pipe was rusted through, but the top half was often in good condition. So what they did with them was to cut off the bottom part, take out the locking bars and then they took them into the Mathers factory in Kellerberrin where they welded the two half segments together, minus the locking bar, and of course the pipe finished up slightly smaller – roughly twenty-eight and a half inches, or thereabout in diameter, instead of the thirty. And the pipes, when they were made in the factory, they were lined by the spinning process.

RH So the Kellerberrin pipes, I don't suppose they were exactly round by the time they finished with them.

KK I think that they were pretty well round, yes, the few I have seen. I'm only just recounting what I've heard. I didn't see that procedure being done at all. I hadn't joined the Public Works at that stage.

RH And the latest section of the Comprehensive Scheme – like you were talking about the ones that were added on down south and north-west in the Cunderdin area – how was that financed? Did they get a Commonwealth grant for that, or was it a loan or what?

KK Mostly they were done by special loans, repayable loans. Yes. Some of the extension were done straight out of State loan funds, but the larger sections were done using funds, extra loan funds supplied by the Commonwealth, but [which] were repayable.

RH It was a period where there was a great shortage of labour. How did Public Works deal with that as far as skilled labour was concerned?

KK The biggest shortage of labour occurred immediately after the war. They used to refer to it as overfull employment. By the time the Construction Branch got onto the Comprehensive work, the shortage of labour had [eased] off a lot. The labour wasn't a large problem, although skilled welders were still pretty hard to get.

RH It was much more mechanised at that time than it was years before.

KK Yes, that is so.

RH Yes, we will just have a pause. {pause}

RH We were going to talk about the time after the war [in 1946] when you went back to university to do a BE degree.

KK Yes, well, while I found university life quite stimulating, I also found it difficult to settle down to concentrate on study.

RH I suppose that was the same for a lot of people who worked during the war or were in the services.



- KK Yes, that's right, having been away from it for so long, you tend to get rusty on that sort of thing. On a personal basis, at home too, I was having a few troubles. It was quite a stressful period. My father, who had been wounded rather badly, or very badly, in World War I, was in very poor health and he subsequently died in December of 1946. That all had an unsettling effect. I didn't repeat the level of academic results that I had achieved prior to 1942 when I was awarded the BSc (Engineering). Nevertheless, I did manage to achieve sufficient results to be awarded a BE degree with third class honours. My thesis was titled "Wartime Storage of Petroleum Products". It was largely based on my experience on Allied Works Council construction jobs during the war. A paper on a similar topic that I delivered to the Institution of Engineers, was awarded the Junior and Students Prize for 1946.
- RH So that was one year that you had to do at university?
- KK That's all. I only had to do the one year. I returned to the Public Works Department in November 1946 and was posted down to Stirling Dam. This was a day labour job on which work had recommenced following its wartime closure. My duties were principally to supervise the placing of earth and rock fill in the dam embankment. The job worked on a two-shift basis and I shared the task with Eddie Gorham.
- RH Was that mechanised earth-moving?
- KK Yes, with earth-moving and rock-fill placing. Most of the earth was loaded by steam navvies, carted in trucks and spread by bulldozers and then compacted with sheeps-foot rollers. To that extent, it was relatively modern in its approach.
- RH It must have been one of the first jobs to have bulldozers.
- KK It was one of the first to have bulldozers and, I think, one of the first to have sheeps-foot rollers. Stan Byass was the resident engineer in local charge and other engineers on the job were Lew Park, Cedric Poole, David Bryden and Bob Hillman. By May 1947, the embankment was substantially complete and I was transferred to Wyndham in that month. This project was to install a large pumping plant and to extend the area of irrigation at the Kimberley Research Station [which was on the bank of the Ord River near Ivanhoe Station].
- RH Were you married by then, Ken?
- KK No.
- RH Oh, you were still single. They send the single men to Wyndham.
- KK Yes, that's right. A hundred and fourteen horsepower diesel engine for the pumping unit was taken from the emergency plant that had been installed at Mundaring Weir to maintain a supply to the Goldfields just in case No. 1 Pumping Station at Mundaring Weir was put out of action by bombing during World War II.
- RH So I suppose that was outside the pumping station.
- KK Oh yes. It was within about [forty] metres of where the No. 1 Pump Station was. You can still see the foundations there. [pause]



RH We were talking about when you went up to Wyndham.

KK Yes. I returned from Wyndham early in October 1947 and was sent to Katanning to take charge of [several] projects. The first one was to raise the embankment at Pinwerning Dam to increase its storage capacity. Pinwerning Dam was the storage dam for Katanning in those day. It was the only source of [fresh] water for Katanning.

The second job was to construct large storage reservoirs at Gnowangerup and Ongerup. The third one was to construct a [concrete] service reservoir on Mt Clarence at Albany. I looked after that job by travelling down from Katanning, and that was where I first met Max Anderson, incidentally.

The fourth one was to construct a series of farm dams for the War Service Land Settlement Scheme. The War Service Land Settlement Scheme had taken over quite a few of the abandoned farms down in those localities and were rehabilitating them to allocate to soldier settlers.

Then, following the completion of this work, I moved to Lake Grace in early October 1948 where I started up a major project consisting of storage dams at Lake Biddy and south-east Newdegate, [as well as] rock catchments and storage tanks at Holt Rock, Purnta Rock and Sugg Rock. These latest set of tanks were east of Newdegate.

RH These were used for town supplies or farm supplies?

KK They used to [be referred to] as key dams. They were used for carting supplies for stock and domestic purposes when the on-farm supplies gave out.

Now this work was only partially completed when Jack Davis took over and I was transferred back to Katanning in February 1949. The requirement was to establish a district office for supervising water supply operations and minor works over an area from Brookton in the north, Bridgetown and Collie in the west and Albany in the south. This was the first attempt by the Hydraulic Engineer's Branch to establish district offices for water supply operations.

RH The Goldfields Scheme had ones before, hadn't they?

KK Yes, the Goldfields Water Supply Branch had district staff [well before then].

RH And those Goldfields District Engineers, did they do just the work on the pipeline or did they all do engineering in the whole district?

KK They did any of the water supply engineering that was required in their districts, yes. And that did cover some key dams, but not many of them, because the pipeline was always regarded as being much more reliable than anything else.

Where did I get to?

RH You started the Katanning District Office.

KK Yes. {pause}

RH We were talking about the winter.



KK Yes, the 1949 winter had a rainfall that was well below the average for the Great Southern and south-eastern wheatbelt. The towns of Narrogin, Katanning and Brookton were particularly badly hit. Brookton Dam was emptied early in January 1950, in spite of severe restrictions that had been put on. Drinking water was carted by road from nearby local soaks to which I was able to gain access. The water was delivered by road truck and placed in domestic rainwater tanks at the rate of five gallons per head per day.

RH So they weren't getting the supplies from Wellington Dam then.

KK No, no. This was 1950. The Wellington Dam Scheme didn't get through for ten years after that.

RH Yes.

KK But this is the sort of thing that provided the incentive to put the Great Southern Towns Water Supply section of the Southern Comprehensive into operation.

The Bottle Creek Dam at Narrogin was also very low and salt seepages developed within the basin area and the water in the dam became unusable for domestic purposes. Drinking water was carted by rail from Collie and distributed by road transport.

RH It sounds like in O'Connor's day!

KK Yes. It was delivered to domestic tanks, again at the five gallons per head per day. The supply main from Two People Bay to Albany, which was the main Albany scheme, was too small to meet the demand and the town ran out of water on a few occasions. At very short notice we had to put in an emergency booster pump to get extra water through from Two People Bay. And at Katanning the scheme had to be only turned on for two days a week.

RH Do you know that at Two People Bay then, they had a similar type of steam pump to the ones they had on the Goldfields pipeline?

KK A smaller variety of the same thing – a steam pumping plant. Yes. That was right. It was a smaller capacity, but the same principles. And as I think I mentioned earlier, Pingelly water supply, which was obtained from the Hotham River, was always too salty for domestic purposes. To top it all, over at Bridgetown they were having an awful lot of trouble with [bursts on] the original Fibrolite pipes, so I had a pretty rough introduction to operation maintenance, you might say.

RH So why were there problems with Fibrolite?

KK Oh well, there were three types of Fibrolite pipes that were [originally] made. The first one, which was introduced in the thirties, was made by what they called the Sutton process. An asbestos cement sheet was rolled out and then wrapped tightly around a mandrel, and then a wire rope was put around it and tightened with the hope that the layers would knit into each other. But, of course, what happened was that the overlapping layers didn't knit in properly and there were times when the water from inside the pipe would follow that seam around until it got sufficiently through the pipe to burst the pipe under high pressure.



Now, the first pipes which were made subsequently were made after the war by what was called the Mangiani process. In that case, the Fibrolite, consisting of asbestos and cement, were mixed up together and were put into a mould under pressure [and] formed a pipe of uniform consistency. They were considerably better. As a matter of fact, they were a very good pipe, because they were easy to handle; they were light; they could be machined and the rubber rings fitted nicely. Cast iron specials could be made and used with them. And we used them quite a lot.

The next process that came out was the Mazza process and that was an improvement on the Mangiani process. They lasted pretty well in the water supply until they have been replaced more recently by plastic pipes, [that is], the PVC pipes. The alternative to the fibro pipe used to be the reinforced concrete pipe that was made by Humes. [It was a reinforced concrete] cast pipe. Now, they were quite good except that they were very heavy. They were cast pipes so that the ends weren't machined. The rubber rings didn't fit quite as well and, if they were dropped, the concrete used to chip. And if it chipped at the end of a pipe, again it would interfere with the jointing. So they weren't quite so popular.

The cast iron pipes were a very good pipe – rather heavy and quite expensive. Very much more recently, of course, instead of the vertical cast pipes as they call them, where the molten metal was just poured into a mould, they had the spun cast iron pipes which was made by the centrifugal process. You finished up with a truer pipe than the vertical cast pipe and you also had the rubber ring joint. Whereas the vertical cast pipe had to be lead jointed, the centrifugal spun one was rubber ring jointed. Then, of course, in the very high pressure areas, you had the welded steel pipes.

RH      So these are all pressure pipes, you are talking about.

KK      They are all pressure pipes in reticulations, yes, and the services were taken off them. The concrete pipes, again, had problems where you had to connect your service in, because you had to chisel a hole through the reinforced concrete, whereas, with the Fibrolite, you could drill it quite neatly. There were other disadvantages, of course. Fibrolite containing asbestos is not so popular these days.

RH      No.

KK      Anyway, to carry on ...

In August 1950, I handed over my work at Katanning to Len Twycross and I moved up to Mundaring Weir where the project to raise the weir wall was now in full swing.[It was] after the disappointing period when they were having trouble getting labour, getting materials, power was short, and everything was working against them. They were just coming out of that period and the production was quite good. The Resident Engineer in local charge was Harold Hunt and my main duty was the supervision of the mixing and placing of the concrete. I had replaced Bob Hillman, who had been transferred to the Construction Branch of the Metropolitan Water Supply Department.

RH      So was this pumped concrete at Mundaring?



KK Yes, that was pumped concrete. They had had quite a lot of teething troubles in the early days. Mainly, getting the pipeline set up properly and also getting the correct consistency in the concrete. The pump plant had the one big disadvantage. If you happened to get a blockage and you had several hundred feet of pipe behind you, you had to be very quick in emptying it. Otherwise the whole batch would set in the pipe and then you were really in trouble.

RH Wasn't there trouble with the power as well? It must have been difficult for concreting.

KK Yes, [a sudden power failure was very serious if it occurred while concreting was in progress.]

With the near completion of the Mundaring project, I was transferred to Harvey in September 1951. The principal task at Harvey involved the construction of the new irrigation and drainage system between Harvey and Benger. We had also rehabilitated the old western feeder channel, which was part of the original Harvey irrigation system.

RH That was unlined, was it?

KK No, it had been lined, but the lining had deteriorated very considerably. While I was in Harvey, I also did any major construction work that we required in the other districts, including some down at the Capel River drainage area – they call it the Stirling drainage area. And then there was large drop structures that were built in the Ferguson River at the back of Dardanup and in the Clarke Brook, which was just near Cookernup, to the north of Harvey. And two or three major bridges over the larger drainage system out the back of Harvey.

RH So it wasn't just drainage and irrigation, you had a lot of other types of work as well.

KK Well, being a construction branch, we did tackle the jobs that were considered a little bit beyond the scope of the district maintenance staff.

I stayed on the job at Harvey until November 1954 when I was transferred to Public Works Department head office in the old Barracks. I was allocated to the Hydraulic Engineer's Branch, or rather the Construction Section of the Hydraulic Engineer's Branch, where by this time, Harold Hunt was the officer-in-charge of that section. Following the sudden death of Mr Victor Munt, who had been Hydraulic Engineer, Don Munro became Hydraulic Engineer.

When I joined Harold Hunt in the head office, the raising of Wellington Dam by fifty feet was under construction. This was like Mundaring. [It was] a day labour job and Roy Hamilton was the Resident Engineer in charge.

Wellington Dam was followed by Logue Brook Dam and, proceeding at the same time as this, was a dam on Tanjannerup Brook, which was part of the Nannup water supply which we were building. This was the first dam where we experienced constructing under contract conditions.

RH There was a contractor doing the work and you were supervising it.



KK The contractor was doing it. We prepared a specification and the contractor did the work and we supervised it. The job on Tanjannerup Brook was supervised by Ern Shelton [who also had a day labour team working on the reticulation.]

RH Did you find that was a satisfactory way of working, compared with what you were used to before?

KK Oh, I think once the contractors get the experience they do have advantages – they generally were able to keep their plant more up to date than we did when we were operating the day labour schemes, and they seemed to be able to perhaps attract more skilled labour – although not always. But the other thing was that if you do build up a specialist team in the day labour situation, you sometimes do find it difficult to get the continuity of work of the type that they are good at. It's a different matter if you are doing routine work; say, operation and maintaining irrigation channels or water supply systems, or sewerage systems, where you are getting the same type of work all the time. Then, in my opinion, a day labour team is infinitely better than a contract team.

At much the same time as we were doing these jobs, the Fitzroy River barrage was under construction by day labour on the Liveringa Station, east of Derby. This job at Liveringa involved the construction of what we called the Fitzroy Barrage. It was a concrete sill that had collapsible shutters mounted on the top and it diverted water into the anabranch, which was known as Uralla Creek and which ran down to an irrigation area at Camballin, which was on the flood plain of the Fitzroy River. At the same time as this was going on, the construction of Kununurra townsite and the construction of the Ord River diversion dam had started. Roy Hamilton was the Resident Engineer up there and, of course, it was one of Harold's principal interests. The diversion dam was opened by Prime Minister Menzies in July 1963.

Between 1954 and 1962, several day labour projects were under construction in the south of the state. These included Mt Barker water supply and Bolganup Dam in the Porongurups; Cranbrook water supply and Tambellup water supply. Then there was the Millstream scheme and pipehead dam at Bridgetown, and at Albany, there was a new water scheme in which the main from Two People Bay, which I referred to earlier, was replaced with a larger main – a twelve inch main – and the new south coast scheme, based on a borefield on the other side of a harbour, was built.

RH That was past the woollen mills.

KK It was around past Little Grove near where the prison is now. The bores were put down in an area near Limeburner Creek. The water was on the hard side and did subsequently require a softening plant. The supply came into a tank that had been constructed on Mt Melville, which was on the other side of town to Mt Clarence, and close to where the woollen mills is, yes. And then also at this same time, the Phillips Creek Dam at Manjimup was enlarged, increasing its capacity from ten million gallons to sixty million gallons.

There were also several other local schemes all by day labour at places such as Dumbleyung, Perenjori, Lake Grace, Three Springs, Morowa and Northampton, and three swimming pools were built on behalf of local authorities under a scheme promoted by the state government at Northam, Goomalling and Quairading.



RH I suppose they are hydraulic structures, aren't they?

KK Well, they are hydraulic structures – subsequently, most of the construction of these swimming pools was looked after by the Country Sewerage Branch, and the majority of them were built by contract.

Now it was in 1962, following the retirement of Mr Jim Young, who was the Director of Works, that John Parker took over as the Chief of the Engineering Division, and that was when the major reorganisation took place, where the Hydraulic Engineers Branch and the Goldfields Water Supply Branch were cancelled. They were both ...

RH Reorganised.

KK Yes. Well, they were joined and then split into four branches, as I described before. They were the Country Water Supply Branch, the Irrigation and Drainage Branch, the PD & I Branch – the Planning, Design and Investigation Branch - and the Construction Major Hydraulics Undertakings Branch.

End of side 1

**End of interview**

AMc/RGH

9 February 2004



**GOLDFIELDS WATER SUPPLY HISTORY**  
**Interview with Ken Kelsall**  
**on 30 May 2002 at Como, Western Australia**  
**Interviewer: Richard Hartley**  
**SESSION 2**

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**Tape 2, Side A**

- RH This is Richard Hartley and I am talking to Ken Kelsall in our second recording session on 30 May 2002. In our last session, Ken, we got up to when you were at Katanning and you started the district office there. We were also talking about some prefabricated housing [which you tried out] at Lake Grace. I believe the housing problems were rather difficult in those days.
- K Yes, well, housing was definitely a problem for staff on these short-term jobs around the wheat-belt, in particular. My own experience was, perhaps, interesting. I was married to Anne McGrath on the 20<sup>th</sup> November 1948. I had met her when I first went to Onslow in 1943. And, as I was saying, [it was at the time] when we went to Lake Grace, that [the problem of housing for short duration] projects was receiving some close attention. The Hydraulic Engineer of the day, Mr Victor Munt, had become interested in an American design for a demountable house, and he thought Lake Grace would be a good place to try out the ideas. [The building] consisted of panels – they were eight feet by four feet – and the house that was put up for me was twenty feet by twenty feet. It was divided into a living room, a bedroom, kitchen and bathroom.
- R So it wasn't palatial by modern standards? {laughs}
- K No, it certainly was not. The laundry and toilet were separate. It was well constructed but it certainly wasn't cheap. It was quite comfortable – a little bit on the cramped side, as you mentioned, and consequently, when the later versions of this design were constructed for Mundaring Weir and Kulin, the floor area had been increased to twenty-four by twenty-four.
- R Were these designs [developed] during the war?
- K Yes. The eight by four panels were bolted together and bolted to the floor, and then it had a trussed roof that came right over the top. So that it was relatively simple – as I say it wasn't cheap to build in the first place – but it was relatively simple. And it got its first tryout when we moved over to Katanning, because the house was taken with us. The problem that it had was that it didn't really fully comply with the building bylaws.
- R Oh dear.
- K The bylaws [were administered by] the Katanning Road Board. However, at that time, the Katanning Road Board, particularly their long-serving Chairman, by the name of Fred Bowden, was very anxious and keen to get an engineer resident in Katanning and I had met Fred when we were doing the raising of Pinwernying Dam. He used his influence, and the house was put on a spare block that he

*Note: The transcript is verbatim except for minor editing by Mr Kelsall which is indicated by squared bracket thus [ ]*



owned next door to his house, down in the south-east corner, I suppose it is, of Katanning. And he was a very good neighbour to me. When we left Katanning, the house stayed behind and was used by the district officer. If you go there now, of course, [you will find that the house] has finally disappeared. It never got shifted from Katanning, but that part of Katanning township was redeveloped and the houses in that area, including Fred Bowden's, all came down. So, as an historical piece, the demountable house had disappeared. And I don't really know what happened to the ones that were built at Mundaring either. I have a feeling that they might have gone to – now I come to think of it – they might have gone to Wellington Dam.

R Yes, that sounds logical, doesn't it?

K Yes, that sounds logical.

R After you left Katanning, you went to Mundaring as ...

K Yes, well, I went up to Mundaring and ... when was that?

R 1949, would it be?

K Yes, it was ... no, 1950. 1950, yes. And Bob Hillman, who had been the concrete engineer up there – offside to Harold Hunt, who was the resident engineer – he had gone to a job in the Metropolitan Water Authority in its construction branch, and I went up with Harold. By that time, of course, the job was going along very smoothly. Less than half of the concrete had been placed but they had overcome all the difficulties that plagued that particular job [from] when it was opened up in 1946-47. They had been troubled with power shortages. Power was cut on and off without any warning. They had insufficient cement. They frequently were cut down to the stage that they could only pour concrete on one occasion per week, and they also, of course, were having trouble in getting a stable workforce. So that, really, you might say that I had a pretty armchair ride at Mundaring, and it was a very enjoyable job, as far as I was concerned. We had the house that had been constructed originally when Don Munro was going to be the resident engineer, and Harold had got himself comfortable in another house. He elected to stay with that for the duration of the job, and we had the bigger house. One [drawback], of course, was that our furniture from the demountable house at Katanning didn't exactly fill up the house at Mundaring.

R Displaced persons were a large percentage of the workforce at Mundaring at that time, weren't they?

K Well, yes, there was a large proportion of them. I think, there seemed to me from just trying to recollect it, that there were quite a lot of Polish origin. They were all strange to the surroundings, but were very, very keen and very good workers. I'm sure they all settled down very well into the community afterwards. Harold was a good boss, and he'd settled in very well with the local community, which comprised mainly of employees of the two pumping stations. No. 1 and No. 2 pump stations were operating in those days, and also the Forestry Department had a divisional office there. We played in the local cricket teams and it was all a very enjoyable period really, as far as I was concerned.



- R After that, you went into the Irrigation and Drainage Branch, down in Harvey?
- K Yes, that's right, in 1951.
- R Was that to gain experience in that different sort of work?
- K Oh, it wasn't to gain experience so much, I don't think. With the completion of Stirling Dam, there had been a desire to increase the irrigation area down there and I did the section of the work from Harvey down to Bengier. So it wasn't so much a matter of experience. Although I had not had any real experience on irrigation, that is the construction of irrigation reticulation, I had worked on Stirling Dam, but not on irrigation areas. We were there for three and a bit years. Again we liked living in Harvey. The accommodation was [somewhat] of a let down from the Mundaring house, as it was a little cottage that had been part of the internment camps set up.
- R Oh, for the Italians.
- K It had been built during the war for the Italians, of which there were a lot living in the Harvey district at that time. That job was held up a little bit because, like the work subsequently, at Wellington Dam, due to the government's desire to attract the BP Refinery to Kwinana, they had got themselves committed to [expenditure in that area].
- R And used up all the funds?
- K ... to build up quite a [substantial] infrastructure down in the Kwinana area, and that took a major proportion of the state loan funds. Harvey Irrigation just happened to be one [project] that was cut back quite a bit.
- R This was flood irrigation, was it?
- K Oh yes, flood irrigation. It was a [typical] irrigation area with supply channels and subsidiary channels, with the usual checks and supply points and that sort of thing. And of course, there were some [major] structures in the largest parts of the channels, flumes, and there were some quite substantial bridges that had to be built over some parts for roadworks. And also, of course, we had to offset the severance that had been created by the open channels through the farms, and we had to provide what we called occupation crossings for those. While we were on that job, we were asked to do some of the major structures within the district, and we put in the big floodgates and things like that down at the Stirling Estate drainage at Capel, and we did big drops in the Ferguson River at Dardanup and in Clarke Brook, which is just near Cookernup, and north of Harvey. There were several others, as well, which I just can't recall.
- R After that, you went back to Perth into the head office, didn't you? Back into another part of the Hydraulic Engineer's Branch.
- K Yes, well, I stayed at Harvey until November 1954.
- R So was that about four years?
- K Yes, well three and a bit years from September 1951 until November 1954. And I went back to the head office. I was pretty pleased to be back joining the



construction section of the Hydraulic Engineer's Branch, as it was then called and, Harold, by that time, was the officer-in-charge. With the sudden death of Victor Munt in 1953, Don Munro became Hydraulic Engineer. Stan Byass, whom I had known down at the Albany and Garden Island jobs during the war, and who had been a resident engineer at Stirling Dam, had become the Principal Assistant to Don Munro. My wife and I moved into a house in Cale Street, Como, where we're still located. So that took me into Head Office, yes.

R That wasn't the big shake-up when the Hydraulic Engineer's Branch was divided up.

K No, no.

R That came later in the sixties.

K This was a period from November 1954. The reorganisation you were talking about happened in June of 1962.

R Oh yes.

K The period from November '54 until '62 was a very active one for water supply construction. The big job, of course, was the raising of Wellington Dam by fifty feet. It was constructed using day labour and was almost a replica of the raising of Mundaring Weir but on a bigger scale, to the extent that Wellington Dam had a fifty foot rise of the wall, whereas Mundaring has only thirty-two. Wellington Dam was to be the source of the southern section of the Comprehensive Water Supply Scheme, and was to supply water to the Great Southern towns, from Brookton down to Katanning. [Initially the Wellington Dam had been constructed to supply water for the Collie Irrigation District (that is, Brunswick, Roelands and Dardanup).]

R So that pipeline, you were saying, was actually constructed by the Goldfields Water Supply people.

K Yes. At that time, the Goldfields Water Supply branch was the recognised expert on above ground large steel pipelines. They had, of course, developed it a little bit from the days of Fernie and Keating in the thirties when the original locking bar lead-jointed pipeline was lifted and relayed above ground. It was continuously welded which, in itself, was a very great undertaking. Yes, the other project in this period that we are talking about, was the construction by contract of the Logue Brook Dam. This was put in to augment the Harvey Irrigation System.

R That was an earth dam, wasn't it?

K It was an earth dam, yes. And when I say it's in the Harvey system, it's actually just about opposite the little township of Cookernup.

R At that time, I assume that there were contractors with sufficient experience to do that sort of earthmoving.

K Well, yes and no! {laughter} We'll come to it later, but this was the time when they were just starting to show interest in constructing a major part of the Ord Scheme and the diversion dam was coming up in which Harold Hunt was naturally involved. We had never built dams, major dams, by contract before and, with the



assistance of Leo Regan from the Crown Law Department, Harold had prepared a set of General Conditions. The works for the Logue Brook Dam [and for the Tanjannerup Brook Dam which was built for the Nannup water supply scheme] were the first that we'd built by contract and Harold's General Conditions were tried out on them.

R There must have been a lot of work involved in writing a completely new form of General Conditions. [We were always inclined to assume that] the General Conditions were there and that they were unchangeable {laughs}.

K Well, the Public Works Department did have a set of General Conditions, but you could never have expected a major contractor on a large project to have adhered to them. They were very much a case of where the department was always right, and they only succeeded if you had a fairly broadminded person administering the contract. But it was [generally] satisfactory for small contracts.

There were other [projects] that were in progress at the time. I have mentioned one previously – the problems of providing a water supply for Albany, and one of the jobs that we did in this period that I am talking about now was to build a new supply main from Two People Bay into Albany. We also built a service tank on Mount Melville, which is on the west side of the town.

Another project which had been going on at that time was the upgrading of the pipeline from Wicherina to Geraldton. That was done progressively and it was a job that Harold became particularly active in. Then down at Manjimup, we were raising the Phillips Creek Dam, which was the water supply to the township of Manjimup. And we also built, at the same time, a dam on the Dirk Brook for the Karnup Prison Farm. That was a job we did for the Prisons Department.

R So that brings us to the end of the fifties, does it?

K Well, no, not quite, at the same time we were doing a tremendous number of dams and schemes which were quite major in themselves. Just to name a few, at Mt Barker the reticulation was based on the Bolganup Dam out in the Porongorups. Then at Cranbrook and Tambellup there were excavated dams with bitumen catchments supplying reticulations. There was a dam at Nannup, the Tanjannerup Creek Dam which was built by contract. As I mentioned before, that dam was being built about the same time as Logue Brook Dam and the new system of General Conditions of Contract was also being used. Then there was a water supply at Lake Grace, again with a bitumen catchment. There [were water schemes] for Morawa, Three Springs, Northampton and Donnybrook which were supplied from groundwater sources. And then there were schemes at Dumbleyung, and at Perenjori. So there was a lot of activity over a wide area.

R These were done for the Country Water Supply section, were they?

K These were done for the Country Water Supply section of the Hydraulics Engineer's Branch, yes. Then, at about the same time, I think, we started building some swimming pools for local authorities, although Harold had more interest in them than I did. They were [built under] a government subsidy scheme. I can remember building ones at Quairading and Northam and another one.

R Goomalling.



K Yes, Goomalling. Yes, that's right. Goomalling. By this time, [the pipeline for] the Southern Comprehensive Water Supply had been constructed, by the Goldfields Branch [as far as] Katanning. We took over the job from there and built the extension from Katanning out to Kojonup.

R Wasn't there a problem there due to a shortage of pipes?

K Well, that was true for the whole [of the first stage of the] Comprehensive Scheme. It was a little bit like the [raising] of Mundaring Weir. It was terribly hampered by shortages of materials, particularly steel. Steel plate for the manufacture of pipes was in very short supply and skilled labour was also hard to get. I mean, the first pipes were laid on the line and I remember going out when I was at Katanning, doing the district job there in 1948, I think it was to see Vic Doney, the Minister of the day, lay the first pipes on the scheme out in a spot somewhere near Collie. And those pipes just sat there for quite a long time before anybody put pipes on either end of them {laughter} because they were giving priority to the upgrading of the original Goldfields pipeline and any pipes that were available were going into the northern section of the Comprehensive Scheme.

I was just saying that it was at about this time that there was talk of starting on the Ord Scheme, but one scheme that did get off the ground just before that, was the one at Camballin. It was an interesting project. It was obviously on a much smaller scale than stage one of the Ord, but it did immediately precede it.

R How was it financed, because it was for a private organization, wasn't it?

K Yes, well, I'm not too sure, but as far as we were concerned, our work was built with government funds, and it was done to encourage irrigation in that area. The facilities that it was going to serve were privately owned by a firm called Northern Development, who also did some of the first irrigation work on a commercial scale at the Ord.

R Wasn't Kim Durack something to do with them?

K Oh well, Kim was associated with work at the research stage, but this was a bit of broad acre development – I just forget the exact size of it. However, it would have been much bigger than the scheme on which Kim Durack had been working. At any rate, this Camballin scheme was on Liveringa Station out to the east of Derby, and it involved building a fairly substantial barrage – a specially designed barrage, with collapsible shutters on the crest of the concrete weir, and it was to divert water into an anabranch of the Fitzroy. The anabranch was known as Uralla Creek and the water flowed down its channel to a dam seventeen miles down the creek which was called the Seventeen Mile Dam. It had a bit of storage but its main purpose was to divert the water into the supply channel of the irrigation area which was privately owned. [Work at Camballin was spread over 3 dry seasons, namely 1959 to 1961.]

R What was the problem there in the end? It didn't last for very long, did it?

K Well, the company had economic problems, but mainly, I think, the problem was that the whole scheme was built on the flood plain of the Fitzroy River which was subjected to large flooding. Unfortunately, after the scheme had been constructed,



they had floods that were much larger than any that had been recorded before.  
{laughs}

R Was that the one which someone said had come from the wrong direction?  
{laughs}

K {laughs} Oh, I don't know about that, but the scheme [was suspect] from an economic point of view. Interest in irrigation up in the Kimberleys was then diverted to the first stage of the Ord Scheme and the first farms were constructed there, so that Camballin had a fairly chequered history.

In the same period that we are talking about, Stage One of the Ord Scheme, which comprised the construction of the diversion dam, and development of the first ten thousand acres of the Ivanhoe Plain, and the establishment of the Kununurra township, was started up, and Harold was the engineer responsible for all contracts in Stage One. And this work together with the writing of the new General Conditions of Contract involved a lot of work for which, in my opinion at any rate, I didn't think Harold ever received adequate recognition. There were three separate contracts for the diversion dam in addition to the main contract with Christiani and Neilson, or rather with Christiani & Neilson and Clough, although Clough only had a very small proportion – about a ten per cent interest, I think. There was a contract for the radial gates with Vickers Hoskins, and one for the hoisting gear, which was with J & E Ledger. The contract for the irrigation area was awarded to C R Keith Earthmoving, who had a subcontractor named R J Davies to build the structures.

R Was that the one which Harold had the problems with?

K Yes, well, as it turned out, Keith got into trouble too. They really weren't experienced enough to tackle the job. I think if it had have been down at Harvey or somewhere like that, they might have been all right, but they weren't the only contractors that have misjudged the problems of working in such a remote area. They didn't have the substance that was needed, and they did get into trouble. And, of course, R J Davies actually ended up giving up the work and the structures were completed by the Public Works using day labour.

R Were they?

K Yes. Now work on the diversion dam was still in progress in June 1962, when there was this major reorganisation of the Engineering Division of the Public Works, the one which you have already mentioned.

R Yes.

K When the Director of Works – that was Jim Young – retired for health reasons in February 1962, he was succeeded by his deputy – that was John Parker – and the title of the position, Parker's position, was changed from Director of Works down to that of Chief Engineer.

R That was a bit of a come down, wasn't it?

K Well, it didn't come down in the amount of work involved which was actually increasing, but it was certainly a come down in status, and was recognised as



such. At any rate, within eighteen months later, he changed back to become known as the Director of Engineering.

R So it wasn't Works. It was Engineering.

K It wasn't Works. Yes, in the days when the position was titled Director of Works. He had control of both the Engineering Division and the Architectural Division. Now the Architectural Division progressively took on a lot more separate activities and even when Dumas was Director of Works he was mainly involved in the engineering works and Paddy Clare, who was the long-serving Principal Architect, was pretty much a separate entity. Don Munro, who had taken over from Victor Munt as Hydraulic Engineer, now became the Deputy Chief Engineer.

Now, we get back to what you were referring to a little bit earlier. Prior to 1962, there had been these two water supply branches in the Engineering Division of the Public Works. The first one was the Goldfields Water Supply Branch and the other one was the Hydraulic Engineer's Branch. The Goldfields Water Supply Branch did all the work associated with the original Mundaring Weir – Goldfields Water Supply pipeline and took in the towns and farmlands that were serviced from that main. The Hydraulic Engineer's Branch looked after the town water supplies that were all served from independent sources – mostly very inadequate and, of course, it also did the irrigation and drainage work right throughout the state [outside the Metropolitan Area].

At any rate, those two branches were abolished and then new branches were set up. The first one was the Country Water Supply Branch, under Reg Keating, whom you have also mentioned earlier – he was associated with Fernie on the development of the above ground steel pipeline designs. The second one was the Irrigation and Drainage Branch – that was under David Bryden. Then there was the Planning, Design and Investigation Branch, commonly known as PD&I, which was under John Lewis. The fourth one was the Construction Major Hydraulic Undertakings Branch, commonly known as the Construction MHU Branch which was under Harold Hunt. As a result of these changes, I became classified as Principal Assistant Engineer in the Construction Branch.

R So the Planning, Design and Investigation Branch undertook the initial investigations for all hydraulic work.

K Yes.

R And the Construction people were the ones who constructed it.

K Yes.

R And the Country Water Supply was the one who managed it when it was finished.

K That was the idea, yes. But, you see, prior to that, going back again, the original designs of the irrigation down in the south west and that were conducted by the Irrigation and Drainage Engineer in the Hydraulic Engineer's Branch, whose name was Reg Edwards. He used to work in conjunction with the Drawing Office, as it was called in those days under a chap named Mr Dent. When Victor Munt became Hydraulic Engineer, he had gradually started to set up his own little design section, which did the major dams, like Logue Brook and the early stages of the Ord. Prior to that, it had been a bit of a mix up. Mr Dumas had kept a direct



interest in it himself together with a chap named Bob MacBeth, who was classed as an Investigating Engineer. It was rather a mixed up sort of arrangement. But at any rate, Munt had established this design section under John Lewis and that was the one that became the Planning, Design and Investigation Branch. The Country Water Supply Branch basically had been the old Goldfields Water Supply and they had taken over the Water Supply section of the Hydraulic Engineer's Branch. The Irrigation and Drainage Branch, which had always been a section of the Hydraulic Engineer's Branch, became a separate branch, and the PD&I was that little organisation that I was referring to under John Lewis and then, finally, the Construction Major Hydraulic Undertakings Branch was the construction section that Harold had been running for several years before that, and had undertaken the first work on the diversion dam at the Ord.

[One of the first changes] that followed the reorganisation, was that (as we have already mentioned) the Construction Branch was given greater responsibility for Stage 2 of the Comprehensive Water Supply.

R Oh yes.

K As we said previously – before that, the Goldfields Water Supply Branch had done all the work on the pipeline from Wellington Dam to Narrogin and then northwards and southwards along the Great Southern Railway.

R So as a sort of trade-off, they were given the maintenance and operation of all the country water supplies?

K They took over the operation and maintenance of all country water supplies, including the towns that had previously been part of the Hydraulic Engineer's system.

So, from then onwards, we started to finish off jobs that had been started before 1962. One of these was the Millstream Dam. That was a dam supplying water to Bridgetown. It's a bit confusing because ...

R We've got two Millstream Dams or rather two Millstreams

K We haven't got two Millstream Dams, but we've got two Millstreams [– one in the South West and the other in the Pilbara].

R Yes.

K [The pipeline from Millstream into Bridgetown] had been originally constructed back in the fifties. It was done at the same time as we were raising the dam at Dean Mill down at Manjimup. At any rate, the pipeline into Bridgetown which was built by John Abbott, had a pipehead dam, just to deflect or divert the stream flow into the pipe. It had a small amount of storage, but not very much. But it was a kind of a permanent stream.

R So that pipeline was done by the day labour section.

K That was done by day labour but the Millstream Dam –which I just referred to – was built by contract. I think, from memory, that it was Thiess Brothers who built it. Yes, it was.



The Ord River Diversion Dam and the irrigation area were completed shortly after the reorganisation and they were opened in 20 July 1963 by the Prime Minister.

R That was Menzies, wasn't it?

K Yes, that was Bob Menzies.

Logue Brook Dam, which had also just been finished, was officially opened on the 4 October. And then, of course, we had been doing a little bit in the northwest - I suppose you'd call it that - where we built a five and a half mile pipeline to deliver water from the up river section of the aquifer down into the irrigation area closer to Carnarvon, to [give a boost] to the irrigation supply. Then, up to 1967, when the next move - you might say - reorganisation took place, we had constructed a major dam, known as Waroona Dam on Drakes Brook. That was to augment the existing irrigation system at Waroona, and this was officially opened in November 1966. Then we built another dam at Manjimup. It was quite a largish one, by contract, at fifty-two feet high. Then we built the Deep Glenbrook Dam, down on a tributary of the Preston River. No, sorry, Deep Glenbrook Dam was located in John Forrest National Park. It was the Glen Mervyn Dam that we built down on the tributary of the Preston River. Then, they had had trouble with a major flood, or rather the threat of one, on the Harvey system, and the spillway was tested to its full capacity with a little bit of luck on our side. So a side discharge spillway was constructed at the Harvey Dam to increase the safety during major floods.

By that time, also, we'd got into the Southern Comprehensive Scheme, in particular, stage two. We built the main from Narrogin to Wickepin, then on out to Yealering and Bullaring. We built lines from Ballidu up to Wongan Hills, Katanning to Gnowangerup, Kokardine to Kalannie, Wickepin to Dumbleyung, Kondinin to Kulin ...

R Some of those were actually in the northern section, weren't they? That was the western end of it.

K Well, yes, they were. They were around the fringes at least of the northern section. One that was quite definitely in the northern section, although it was never really considered part of the Comprehensive Water Supply was the main from No. 6 pump station at Ghooli up to the new township at Koolyanobbing.

R Oh yes.

K Then, again, Albany Water Supply was being used up to capacity and there was a major scheme which supplied water to Albany from the bore field near the south coast. This was completed in this period. Because this ground water came from a limestone aquifer-, it was hard and a water-softening plant was constructed at Albany.

Then in 1966, a new water supply for Geraldton was completed by day labour from a groundwater source at Allanooka.

R So that superseded the Wicherina one, did it?

K Well, yes, it did. The Wicherina scheme then became a little bit superfluous and it was turned around and ran the other way, as a matter of fact. That's the one which {laughter} you were probably thinking about, isn't it?



R Yes.

K Yes, it went out to Mullewa instead. Yes. So Mullewa was supplied from the Wicherina source. At any rate, the scheme at Allanooka was a big scheme and it consisted of a five million gallon summit tank at the bore field. From there the water flowed by gravity into Geraldton through thirty-one miles of 24 inch diameter steel pipe laid above ground by day labour. So it was quite a large scheme. Then from this same source at Allanooka, a reticulated water supply was put in to serve Dongara. We had the usual run of minor new works – you might call them – constructed from local sources generally, at Kirup, Kukerin, Newdegate, Capel, Boyanup, Northcliffe, Jerramungup, the usual jobs.

R So what about the Pilbara. That was starting up at about this time, wasn't it?

K Yes, well, that's right. It did come up. In the north west there was a water supply constructed to Exmouth. That had become a major defence area for the United States Navy had their communications station up there, and of course there was a big staff requirement. And then Exmouth had also started to take off as a tourist area. The Americans had established their own water supply, but didn't appreciate the complexity of [the hydrogeology of] that area. Exmouth was a place where there was a very high intrusion of saline water from the gulf. .

R So you couldn't pump it too fast.

K That's right. The only fresh supply was from rainwater which had permeated through the surface and was sitting on top of the salt. So the location of the suction of your pumps had to be very carefully done, otherwise you could stir it up and get a mixture with the salt that was underlying it. And that's precisely what the Americans did do, and they were pretty happy to use our system after that. {laughter}

Then the next one, to come back to what you had just mentioned, was at Port Hedland to which a supply main was laid from the Turner River aquifer. This was finished in May 1966, and shortly after that the main was extended to bring in the aquifer alongside the Yule River.

R Those two aquifers were south of Port Hedland, weren't they?

K Yes, they'd be to the south. But you get a bit confused up there because Port Hedland is out on a bulge of the west coast and, when you think you are heading north from Port Hedland, you are actually heading east!

End of Side A

Side B

K Harold Hunt was then promoted to a position of Executive Engineer, Construction, it was called – located in the office of the Director of Engineering and I was appointed to [his former] position as Engineer Construction Major Hydraulic Undertakings Branch.

R That's really a mouthful, isn't it!



- K Yes. It's amazing how I followed on behind Harold for quite a long period. That next period, of course, was also a very important one in my career – I thought it was. It was dominated by the construction of the Ord River Dam. After completion of Stage One of the Ord River Scheme in July 1963, the state government had repeatedly made submissions to the Commonwealth Government for financial assistance with Stage Two. The principal feature of Stage Two, of course, was the construction of the Ord River Dam. However, in spite of the enthusiasm for the project that had been shown by Prime Minister Menzies when he opened Stage One, the Commonwealth Government refused to be rushed into any decision about further development. The main problem was uncertainties that were being expressed at that time about the economic viability of the irrigated agriculture in that region. Nevertheless, the PD&I Branch, under Ken Webster, assisted by Bill Wilkin and Bob Wark, had proceeded to finalise the design for the major dam and engineers from the Snowy Mountains Authority had also made a significant contribution.
- R When was it decided it was going to be a rock-filled dam, rather than a concrete dam?
- K Well, that is something that came about progressively as they did more investigation work at the No. 1 dam site, which is the one that Dumas had picked.
- R That's the one furthest south, is it?
- K Yes. He picked seven dam sites through that gorge and the one that had the narrowest opening was No. 1 site – that was on the southern extremity of the gorge. But then, when they did start to do more work, they began to realise that the Ord was a bigger river than, perhaps, they might have imagined, and that the No. 1 site had problems [in providing for a] spillway that could handle the flood. And also there were a few foundation problems as well.
- R Was that because the spillway would have to be cut into the rock on the side? It wasn't incorporated in the dam, was it?
- K Well, that was the way considered at the time when they were planning [to use the] No. 1 site. Dumas's idea was it was to have been a concrete dam but just where the spillway might have been had not been decided. It might have taken over the top of the dam wall itself, like many others.
- R Making a weir.
- K Make a weir of it, yes. But, of course, by then they had realised that it was a tremendously large river. And so the design, as you were saying, that was finally adopted for the Ord River Dam was quite radically different to what had been visualised, when the initial surveys and the diamond drilling had been carried out in 1945 at the original site. The type of dam had been changed from a concrete gravity dam, visualised by Mr Dumas, to a rockfill embankment of the type that had been used quite extensively by the Snowy Mountains Authority, and particularly, on two that I had the pleasure of seeing which were Blowering and Talbingo – they were the two last of the Snowy Mountain dams.
- R Yes, Talbingo.



K And then, as I said, the dam was [finally located at] the No. 2 site, which was some three quarters of a mile downstream of the original one. Another innovation in the design was to locate the spillway some five miles from the embankment and to utilise the reservoir's tremendous capacity to store water from the flood periods. This enabled the spillway to be much smaller than would normally be required for a dam on such a major river.

R It also meant that the dam would have to be higher itself, didn't it?

K Well, yes, and it was relatively simple to provide for this extra storage, and so, in effect, they stored the floods and then released them as relatively small flow over a long period. Approval to proceed with Stage Two of the Ord River Scheme was given by the Commonwealth Government in October, 1967, and the Public Works Department then immediately proceeded to complete the drawings and the specification. And then, at the same time, a start was made to establish a village to provide accommodation for both the department's and the contractors' workers with their families. Applications were called in March 1969 on a worldwide basis from contractors who were interested in tendering for the project. By this time, we had had enough trouble at Logue Brook and other places by having open tenders, so we decided that a little bit of preselection was going to be a big advantage. [Out of the contractors who expressed an interest in tendering] we selected a group. The tender documents were then [issued to this group] early in July 1968, [and the next step was to arrange a detailed site inspection for each of the selected tenderers which I conducted] in mid-August.

R Were there any Australian contractors, as well as American contractors?

K Oh yes, there were both. Well, as a matter of fact, most of the selected tenderers – even the ones that were of American origin – had worked in Australia, either down on the iron ore area or on the Snowy Mountains. Firms like Morrison-Knudsen for example.

R What about Dravo? Where had they worked in Australia?

K They hadn't worked in Australia [on a major project] at that stage. They had [only recently] established themselves in Australia and, I think they were looking for a high profile job like the Ord. [Dravo later constructed an iron pelletising plant in the Pilbara.]

R Okay, we will have a little pause now.

We were just talking about you showing the contractors around the site. So how many contractors were involved in that?

K Yes. There were eight tenderers originally selected. Eight tenderers were originally selected [but two of them subsequently withdrew. Dravo was not originally selected but was added to the list following the withdrawals.]

It was in mid-August that I conducted the detailed site inspection for each of the selected tenderers in turn. All aspects of the work were explained and they were shown drill cores from the rock, plus samples of the clay, as well as the filter materials. The tenders were closed on October the 15<sup>th</sup> 1968, and on November the 19<sup>th</sup> of the same year, a contract was awarded to Dravo Pty Ltd, which is the Australian subsidiary of the Dravo Corporation of the United States. The



construction of the Ord Dam was carried out during the three dry season of 1969, 1970 and 1971. The dam stored water during the 1971-72 wet season, and it was officially opened by Prime Minister McMahon on the 30 June 1972. The Public Works Department was represented on site during construction by a very competent team. The senior members of the staff were Barry Gale, Bob Perkins and Peter Shaw. Barry Gale was Resident Engineer and both he and Bob Perkins had been seconded from the Snowy Mountains Authority. I was appointed Engineer for the contract and I held that position for the full contract period.

R That's Engineer with a capital "E"! {laughs}

K Yes. Capital "E"!

R {laughs} As written in contracts!

K That's right. There were two other major projects constructed in the region at the same time as the Ord River Dam. The first one (during 1970) was a new airport at Kununurra for use by the Fokker F28 Jet Aircraft. It had a bitumen sealed all-weather runway that was 5000 feet long and 150 feet wide. The airport was complete with bitumen sealed taxi-ways and apron area, plus a terminal building. Navigation aids and night landing facilities were provided. Peter Shaw was the resident engineer on this particular part of the project.

The project was carried out on behalf of the Shire of Wyndham-East Kimberley and close liaison was maintained with the Department of Civil Aviation in Melbourne.

R So it wasn't the state government that actually did the airfield.

K No, well, it was a complex arrangement. There had been some arrangement made by the Commonwealth Government that in order to break down the isolation of these areas they would provide certain funds as subsidies to local authorities to construct airports. But, of course, the idea was never to build anything as big as was done at Kununurra out of this particular fund in any one year. It turned out that the aerodrome was built under a grant made to the Wyndham-East Kimberley Shire by the Commonwealth Government, who engaged the Public Works Department to be the [constructing authority] for the work. It was built by the PWD Construction Branch dealing directly with the Department of Civil Aviation.

R Oh, DCA designed it.

K They did most of the basic design. They didn't handle the drainage side of it, but they certainly did the design of the runways and the thickness of the pavements and all that sort of thing; and the testing of the soils. And our architectural division did come in at the final stages with the design of the airport terminal building, which followed pretty closely the design that had been used at Karratha.

Then in 1971, a rock-fill dam was constructed on Moochalabra Creek to augment the water supply to Wyndham. Peter Shaw was again resident on this job. And the Moochalabra Dam was almost unique, inasmuch as it was one of the few rock-filled dams that have been permitted to be overtopped, and so it was unusual, and it worked out to be very satisfactory, because the site did not allow the development of a bypass spillway at all. So, there was no alternative but to let the water go over the top [of the embankment.] Normally, under those conditions



you'd have gone for a concrete dam, but instead it was a rock-fill dam that relied on a welded steel mesh [fixed over] the top of the rock to hold [the rock in place during overflow].

R So it was very similar to the intermediate stage of the construction of the Ord Dam itself.

K Exactly. Precisely.

While, of course, all this work was going on in the Kimberleys, work was still continuing in other parts of the state.

R Yes.

K The largest of these projects was the scheme to supply three million gallons per day of water to the Dampier-Karratha area, and this job was constructed on behalf of Hamersley Iron Pty. Ltd. The head works consisted of six large production bores in the calcrete aquifer at Millstream on the upper Fortescue River. The supply main consisted of eighty-four miles of steel pipe laid above ground. It was laid to the Goldfields Water Supply specification.

R You were saying that there actually wasn't a written specification available for pipelines laid to the Goldfields Water Supply procedures and that you had to write one covering them.

K Yes. There was no formal specification but, nevertheless, there were several people in the [former] GWS Branch who understood what [the requirements were and they assisted us in writing the specification]. As I said, the pipeline was laid above ground and the route covered some very, very rough terrain and involved several stream crossings – the largest of which, of course, was the Fortescue River itself. I think it wouldn't be exaggerating to say that country [which it crossed] would probably have been the roughest that an above ground steel pipeline had been laid across, in Western Australia, at any rate.

R To put it underground would have cost umpteen much more, wouldn't it?

K Well, it was solid rock [most of the] way!

R [laughs] Yes.

K Five steel service tanks were required, each of two million gallon capacity. The field supervision on behalf of the Public Works Department was carried out by [Colin Temby] and, as I mentioned before, Hamersley Iron financed the work.

As we were discussing, the scheme was constructed in accordance with the system that had been devised by Fernie and Keating back in the thirties, but it was the first occasion that an above ground pipeline to this specification had been tackled [by contract], and the preparation of the document in relation to a written specification and drawings was largely the work of Keith Permain, one of the engineers who'd worked extensively on the Wellington Dam to Narrogin pipeline – he had been in charge of that – and also some [further] work in the Great Southern.



The Millstream Scheme came into operation in October 1969. Also constructed in this period was the pipeline between Morawa and Perenjori. There was also a large excavated storage which was constructed at Mount Roe in the south east wheat-belt and a water reticulation scheme {pause} Well, there were also several of these small reticulation schemes that were built then.

In 1970, the Director of Engineering, John Parker, retired and his Chief Engineer, Mr Munro, became Director of Engineering. Harold Hunt became Chief Engineer, and I was promoted to Executive Engineer Construction. I was succeeded at the Construction Major Hydraulics Branch by Steve Shelton, who had been continually associated with construction projects since he joined me at Lake Grace in 1948, while he was still a cadet.

Well then the next period was from 1970 until the next reorganisation in the Public Works and, during this period, a pipehead dam and pumping station was constructed on the Helena River, approximately five miles downstream from Mundaring Weir. The purpose of the project was to collect the flow from the lower part of the Helena Catchment and to pump it back to storage at Mundaring Weir. The project has turned out to be a marked success, and in some years, it has provided up to forty per cent of the total inflow into Mundaring Weir.

R That's remarkable. Was there any trouble with pollution in the extended catchment area?

K Oh well, it has to be watched because, particularly at Piesse Brook. There are several orchards there, and so the area has to be [carefully] watched. But its quite an extensive area of catchment on the edge of the scarp, which does get a high rainfall, whereas the catchment of Mundaring Weir itself goes right back, out towards York and the rainfall tails off quite a bit out in those eastern areas. So this was not a particularly large area, but combined with the high rainfall, it was a very valuable catchment.

R Good value for money.

K Well, yes. And also, [in low rainfall years, it provided a large portion of the total inflow into Mundaring Reservoir.].

Then in the West Pilbara, the Millstream scheme was extended to serve Cape Lambert and Wickham. This required the laying of some twenty-seven miles of 24 inch and ten miles of 21 inch diameter pipe.

R Wasn't there a problem about over-pumping at one stage in the Millstream?

K I'm not sure what you mean.

R The conservationists were saying that some of the trees were dying off.

K Oh yes, I see what you mean. Yes. The Millstream scheme did reach that stage, but that was a little bit later.

R Was it? Oh.

K And that is what led to the construction of the Harding Dam.



- R Oh yes.
- K The Millstream water was hard and, also, the pipeline was laid above ground, so the water got pretty warm.
- R I bet it did. {laughs}
- K By the time it got into Karratha ...
- R You had to cool it down before you could put your hands under it. {laughs}
- K Well, you didn't have to use the hot water tap to have a shower, I know that!

The Ord River Dam was completed in December '71, and it was officially opened by the Prime Minister in June of '72. There was another key dam completed in October '71 at Mount Roe, as I have mentioned. Jobs such as this were always going on and [the key dams] were very, very valuable for drought protection in those outer areas of the wheat-belt.

- R Were these in marginal sheep and wheat areas?

- K That's right. You are getting right out into the area to the east of Lake King and very much to the south-east of Merredin.

Then, in December 1971, Don Munro was appointed Coordinator of Development in the Department of Development and Decentralisation, and he was succeeded as Director of Engineering by Bob Hillman, who had been the Chief Engineer of the Metropolitan Water Board. Harold Hunt was then appointed Chief Engineer of the Metropolitan Water Board and, in July, 1972, I became the Chief Engineer of the Engineering Division of the PWD.

- R Was your position still called Chief Engineer then? When did it change to the new name?

- K That came a bit later. Now in my new position, there was a considerable amount of administrative work. You know, less of the hands on engineering that I had experienced up till that stage, and I was also exposed to harbour works with which I had had no direct contact since my cadet days. Some of the harbour works undertaken included the construction of the new No. 5 berth at Geraldton, and dredging of an approach channel. Then there were fishing boat harbours at Carnarvon, Denison, Jurien and later, towards the end of the period, at Esperance. New jetties for the ferries at Barrack Street were constructed in the Swan River and there was a small boat harbour constructed up at Ocean Reef, using the groin that had been constructed by the Metropolitan Water Board when it was launching the outfall pipe for the Beenyup Waste Water Treatment Plant.

Probably the most difficult issue that we met at that period was the establishment of an equitable procedure to administer the decision recommended by the Water Resources Council, and approved by Government, to apply clearing controls over salt-sensitive sections of the major rivers in the southwest, that had not already become saline.

- R I don't quite understand what you are talking about here, because I didn't know that the Public Works Department was involved in that type of work. I always



thought that it was something that the Department of Agriculture or the Environmental Protection people dealt with.

K No, no. The Public Works Department administered it.

R Oh.

K Well, in those days, the Public Works Department was responsible for the water resources of the state [which were] outside the metropolitan area. These all came under the so-called PD&I Branch at that time, and people like Brian Sadler and Don Collett were deeply involved. The Department of Agriculture had always been associated with it, and of course, by that time, we had a Department of Conservation and Environment, but nevertheless, the decision had been made that [catchment] clearing controls came under the Minister for Water Resources.

Any rate, the idea was to get the salt sensitive areas, which had been identified by the PWD Hydrology Group and no farm clearing was to be allowed in those areas. But there had to be quite a lot of administrative shuffling with the farmers who were inconvenienced. Certain farms had to be bought, [and others were re-grouped]. It was a fairly traumatic period, but Graham McKinnon, who was the Minister for Water Resources at the time, remain firm on it. The two engineers who did most of the difficult field negotiations were Ern Shelton and Eric Cooper.

R I suppose if he had been a Country Party minister, it might have been a different story.

K Well, it might have been, it might have been. Certainly, the farmers' union were very vocal on [the subject], and in all their magazines and things like that, but I don't think the total community was quite as much aware of the problem, or sensitive to the problem, to the extent that it has become subsequently. I think if you ask people now about catchment clearing controls, they are all for it. You know, it has certainly saved a lot of old growth forests.

R Yes. This was the 1970s when people were still talking about clearing a million acres a year or something, weren't they?

K Well, they'd woken up to it. Up until about that time, sure, that had been done and certainly a lot of damage had been done to those rivers, particular those ... say, for argument's sake, by the extensive amount of land clearing around Rocky Gully, and that had done a lot of damage to rivers like the Denmark River and the Franklin River and ones like that. So maybe it was something that had come in a bit on the late side but, it had to happen and, as things have turned out, it's a jolly good thing that it did happen. You have to consider it as being fairly innovative, I think.

R Yes.

K So any rate, that was catchment clearing control and it was a big thing when it first was introduced. Then, in January 1975, I became key figure in a major arbitration to rule on a claim by Dravo Pty Ltd that there had been an unforeseen adverse physical condition at the Ord River Dam. It mainly applied to the quartzite rock, but there were other side issues.

R So that was done in front of an arbitrator, rather than a court.



- K Rather than a court. Harold's experience with the Ord had been in front of a Mr Justice Hale. [Our case was handled by an arbitrator from Sydney named Lawrence.]
- R Yes. An arbitration seems a much better system.
- K Well, yes. Dravo Pty Ltd, of course, had built the magnificent dam. [The contractor had been] set a very difficult, but precise, timetable [and it] had adhered very strictly to it. So there was a lot of good feeling, you know, on the government's part towards them. Dravo had submitted the lowest tender, and the tender contained indications that the problems of working in the remote Kimberleys had not, perhaps, been fully appreciated. I'd pointed this out to the company representatives in discussions, following the opening of tenders. Dravo Pty Ltd was the Australian subsidiary of a major American contractor, as I think we've already mentioned, and one of the firm's objectives, after establishing in Australia, was to get a high-profile job, such as the Ord River Dam. The company representatives acknowledged that the tender had been keenly priced, but they obviously understood the requirements of the contract and were certainly very happy to proceed.
- R A bit of an expensive loss leader.
- K Oh yes, but, you see, at the time they obviously understood [dam construction]. They had done all the inspections. You couldn't fault their understanding [of the project].
- R Didn't the Public Works Department make a offer to settle before arbitration?
- K To settle?
- R Yes.
- K Oh, before arbitration? Oh well, there was a little bit of talk about that but let me just say that we'd never doubted, [nor ever contested], the fact that the quartzite rock was very, very hard, abrasive, and massive.
- R Yes.
- K However, in rebuttal to the contractor's claim, it was pointed out that the properties of the rock were fully and accurately described in the geological section of the tender document and also, we believed that an experienced contractor – as they obviously were – should have foreseen the quarrying difficulties after studying the diamond drill cores and inspecting the large boulders that had fallen from the faces of the cliff around the site. You see one of the big items in the contract was the rock-fill and that required the rock to be shattered into handable sizes and also there was a certain grading requirement that had to be met. And when you saw these boulders – about the size of a domestic kitchen – that had fallen off the cliff face and hit the hard rock underneath and still had not broken, you knew that that rock was not going to fall apart readily.
- R Yes.
- K At any rate, the thing was contested. Now you mentioned earlier, the fact that there was talk of a settlement. There was in political circles – particularly over



here – a certain feeling that Dravo had done a very good job and that maybe, under the circumstances, although maybe they didn't have any genuine claim, there was a chance that an ex gratia payment of some sort might not have been [unreasonable, although strictly not] in accordance with contract conditions. Such a payment was talked about before [the Commonwealth intervened]. All the contract work and everything else associated with the main dam was financed as a grant to the state government by the Commonwealth Government. It was the Commonwealth Treasury which said no to an ex gratia payment. An offer was never actually made, but there was a little bit of a feeling that Dravo had been very good and that it wouldn't have been too much out of the question to have made such a payment. It's been done on other occasions before. But any rate, it didn't happen, and of course I spent a lot of time preparing for and attending the arbitration as [the key] witness [for the PWD]. In this I received great assistance from Peter Shaw who had been through the construction up there. The final outcome was that the contractor's claim was completely rejected by the arbitrator and they got nothing at all out of it.

R There was only one arbitrator, they didn't appoint a panel of arbitrators?

K No, Mr Lawrence was the sole arbitrator.

In 1978, I was requested by the Metropolitan Water Board to undertake an overseas study with an officer of the Board – an engineer named Bob Fimmel – to investigate and report on any recent developments in the management of alternative waste water management systems in residential areas. The study [covered] five weeks and took us to the United Kingdom, Sweden and then the United States of America. We presented a comprehensive report which provided the incentive for the Public Health Department to upgrade – amongst other things – the design of the septic tanks.

R Because that was one of the problems really. Septic tank sewerage came under the Public Health Department, and not under the Water Board.

K That was one of the problems. We did find that when we looked at different types of [technologies, different countries were more advanced in some areas]. Sweden was very strong on composting toilets and [vacuum assisted reticulation.]

R Oh yes.

K The UK system wasn't a great deal different to ours. The American systems were where we learnt the most. We learnt over there that the drain fields from septic tanks used to clog the soil up, but you could easily free the clogging if you had an alternative system. Then the bacteria would free up the soil in the section of the system that was being given a rest. Now, in other words, if you had two leach drain systems, you could keep both of them operating very well by alternating them.

Unfortunately the big disadvantage with that was that it required a large area to operate in and, as blocks of land in the residential areas were getting smaller and smaller, you started to run out of [space for] leach drains. Soak wells also did work in much of the freer draining Perth sand, but even with them there were difficulties. We saw some of the small American domestic secondary treatment plants operating, but we did get the impression that a tremendous number [of



them were ineffective]. We went to one or two suburbs and we found that something like thirty per cent of these plants were broken down. In other words, the householder either didn't know [the system had malfunctioned], or wasn't very interested in keeping his system going, which meant that instead of getting the very good effluent that these little systems were capable of producing, if they weren't maintained properly, they were very, very unsatisfactory. And I don't know just how they would have fitted into the Australian scene. You still had to dispose of the treated effluent, but it could be put onto gardens quite safely. And in Sweden, of course, they were very keen on composting toilets, but we saw enough of them too to realise that, if they weren't looked after properly [they could actually introduce a health hazard].

R Yes, you have to monitor the ratio of the nitrogen and phosphorus.

K Yes. And [control] the moisture, yes. Getting them too wet was one of the problems. We did see some that were operating very nicely but, again, I think the Swedish outlook would be different to [that of] a lot of Australians. They were more systematic in their handling and operating of these systems. Anyway, it was an interesting experience for me and I would suspect that it was Harold's idea that I should go, rather than have a more senior person from the Metropolitan authority.

Also during that period, I took over from Harold Hunt as Chairman of the South West and the Albany Regional Development Committees. I also became Chairman of an interdepartmental committee which examined the effects of woodchipping on water resources. I was a member of the Australian Water Resources Council and of the National Committee on Large Dams. In January 1976, my position had been amended or retitled, I suppose is a better way of describing it, to Deputy Director of Engineering. Then in October 1980, Harold Hunt retired and on the 22<sup>nd</sup> October 1980 I succeeded him as Chief Engineer of the Metropolitan Water Board. That title was also changed to Director of Engineering on the 1 May 1981.

I'd lived for most of my life in the Perth metropolitan area and was familiar with the suburban development. I'd also had a general knowledge of its water supply and sewerage systems. I was very content with my position in the Public Works Department and, consequently, I was somewhat apprehensive about the change. However, I must admit that that feeling did not last for very long.

R Did you have any suspicions at the time that the Public Works Department, as a unit, had a short life to come?

K I don't know that that played a big part in it. What I was conscious of was that I used to read the daily newspapers and listen to the wireless and I did know that the [officers of the] Metropolitan Water Supply were under a fair amount of stress. They were copping a lot of flack at that time. I had had the experience on the catchment clearing control, and I knew what to expect when dealing with farmers, but it was nothing like the sort of thing that you get when you are listening to talk-back radio.

R You should never listen to talk-back radio! {laughs}



K Well, I mean a lot of people do, unfortunately, and it's generally a case of airing problems, real or imaginary, and certainly there is a tendency to be anti-the bureaucrats, [and] public servants always come under that category. So that was my immediate problem. I do admit that, at the time, the Metropolitan Water Board was still recovering from a major drought, that it had severe water restrictions – a complete ban on sprinklers, for one thing. That was in 1978. And the Metropolitan Board was pressing on with the use of unconfined groundwater – that's the shallow groundwater from Gngangara and Jandakot. It had introduced pay for use water charging to replace the old system, which had been based on rateable values, and required developers to pay for reticulation extensions. It was also endeavouring to obtain a contribution from developers towards the cost of head works. Now one of my first tasks, when I got over there, was to try and work out, and I did reach an agreement with the developers for head work contributions, and that system was introduced and it still operates, of course, but I think its been modified a fair bit.

R Could we go back to the Public Works Department for a moment? There was a reorganisation of the department into operational areas, wasn't there? When did that come about – the formation of Operations North and Operations South?

K Well, that came in about 1975.

R Was that after all the major works were beginning to tail off as far as dams and water supplies?

K Yes. Yes, that's right.

R That affected the organisation of the Goldfields pipeline people as well.

K It did have a big impact. Fundamentally, the point was that in 1962, the Public Works Department [had been] well and truly at the start of a major upheaval of construction involving water supplies right throughout the state. It was at that time that John Parker had become Director of Engineering and he initiated the reorganisation that established a Construction Branch to which we've already referred. Now that branch had a very, very busy period right the way through until shortly after the completion of the Ord River Dam in 1972. We went on then doing works in the country areas, particularly in the Pilbara, but it became very obvious that the problem in future in the water supply area was not so much going to be the construction of new schemes, it was going to be the operation and maintenance of schemes that they already had, and that the operational activities that were required in the mid nineties were so much greater than those that had been required in the early sixties, when the Construction Branch was formed.

The principal outcome of the 1975 reorganisation was to abolish the Irrigation and Drainage Branch, the Country Water Supply Branch and the Construction Major Hydraulic Undertaking Branch, and set up two major operations branches, which were named Operations North and Operations South. And they were to do all aspects of the water supply, in respect of construction as well as operation and maintenance. The two big jobs that I seem to recall, that were constructed after that, was, firstly, the De Grey Scheme up in the Pilbara. Operation North did that with Jack Davis playing a major role. Operation South's big project that I recall was the water supply to the Mandurah area.



**End of Side B, Tape 2**

**End of interview**

10 February 2004  
AMc/RGH



# WATER CORPORATION

## GOLDFIELDS WATER SUPPLY HISTORY PROJECT

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